

***FlyBy Math™* Alignment**  
**Academic Standards: Mathematics**

**Number and Operation**

**Content Standard 1.0** The student will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

**Learning Expectations and Accomplishments**

- 8.1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
- j. understand and use ratios and proportions to represent quantitative relationships;

***FlyBy Math™* Activities**

- Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.
- Use graphs to compare airspace scenarios for both the same and different starting conditions and the same and different constant (fixed) rates.

- 8.1.3 Solve problems, compute fluently, and make reasonable estimates.
- g. solve multi-step real-world problems involving whole numbers, fractions, decimals, and percents;
- h. develop, analyze, and explain methods for solving problems involving proportions (e.g., scaling, finding equivalent ratios)

- Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.
- Predict outcomes and explain results of mathematical models and experiments.
- Use graphs to compare airspace scenarios for both the same and different starting conditions and the same and different constant (fixed) rates.

**Algebra**

**Content Standard 2.0** The student will understand and generalize patterns as they represent and analyze quantitative relationships and change in a variety of contexts and problems using graphs, tables, and equations.

**Learning Expectations and Accomplishments**

- 8.2.1 Understand patterns, relations, and functions.
- a. represent, analyze, and generalize a variety of patterns with table, graphs, words, and when possible symbolic rules;
- c. relate and compare different forms of representation for a relationship;
- e. compare and contrast properties of functions from tables, graphs, or equations.

***FlyBy Math™* Activities**

- Represent distance, speed, and time relationships for constant speed cases using tables, bar graphs, line graphs, equations, and a Cartesian coordinate system.
- Choose among tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.
- Compare airspace scenarios for both the same and different starting conditions and the same and different rates.

- 8.2.2 Represent and analyze mathematical situations and structures using algebraic symbols.
- b. develop meaning for intercept and slope;
- d. use a variety of forms to represent linear relationships;
- i. apply given formulas to real-world problems;
- m. develop understanding for particular values of patterns, relationships, and functions (e.g., x- and y-intercepts, slope, maximum and minimum

- Represent distance, speed, and time relationships for constant speed cases using linear equations and a Cartesian coordinate system.
- Interpret the slope of a line in the context of a distance-rate-time problem.
- Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft

values).	conflicts and predict outcomes.  --Use the distance-rate-time formula to predict and analyze aircraft conflicts.
8.2.3 Use mathematical models to represent and understand quantitative relationships.  a. use a variety of representations to solve real-world problems (e.g., graphs, tables, equations).	--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.
8.2.4 Analyze change in various contexts.  b. develop meaning for rate of change in real-world situations.	--Interpret the slope of a line in the context of a distance-rate-time problem.  --Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.

## Geometry

**Content Standard 3.0** The student will develop an understanding of geometric concepts and relationships as the basis for geometric modeling and reasoning to solve problems involving one-, two-, and three-dimensional figures.

Learning Expectations and Accomplishments	<i>FlyBy Math™</i> Activities
8.3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems.  a. graph points in the coordinate system.	--Plot points on a schematic of a jet route, on a vertical line graph, and on a Cartesian coordinate system to describe the motion of two airplanes.
8.3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems.  c. use visualization and spatial reasoning to solve real-world problems.	--Calculate and measure the position and time of simulated aircraft. Represent that motion using tables, graphs, equations, and experimentation.  --Predict the relative motion of two airplanes on given paths.  --Apply mathematics to predict and analyze aircraft conflicts and validate through experimentation.

## Measurement

**Content Standard 4.0** The student will become familiar with the units and processes of measurement in order to use a variety of tools, techniques, and formulas to determine and to estimate measurements in mathematical and real-world problems.

Learning Expectations and Accomplishments	<i>FlyBy Math™</i> Activities
8.4.2 Apply appropriate techniques, tools, and formulas to determine measurements.  b. select and apply techniques and tools to accurately measure length, perimeter, area, volume, and angles to appropriate levels of precision; g. solve problems involving rate/time/distance	--Calculate and measure the position and time of simulated aircraft. Represent that motion using tables, graphs, equations, and experimentation.  --Apply mathematics to solving distance, rate, and time problems for aircraft conflict scenarios.  --Use graphs to compare airspace scenarios for both

(i.e., $d=rt$ ); j. construct tables and graphs to represent rates of change.	the same and different starting conditions and the same and different constant (fixed) rates.
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## Data Analysis & Probability

**Content Standard 5.0** The student will understand and apply basic statistical and probability concepts in order to organize and analyze data and to make predictions and conjectures.

Learning Expectations and Accomplishments	<i>FlyBy Math™</i> Activities
<p>8.5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer questions.</p> <p>a. formulate questions, design studies, and collect real-world data for investigations using a variety of collection methods (e.g., random sampling, simulations);</p> <p>b. select, create, and use appropriate graphical representations of real-world data (e.g, histograms, box plots, scatterplots).</p>	<p>--Conduct simulation and measurement for several aircraft conflict problems.</p> <p>--Represent distance, rate, and time data using tables, line plots, bar graphs, and line graphs.</p> <p>--Choose among tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.</p>
<p>8.5.2 Select and use appropriate statistical methods to analyze data.</p> <p>c. discuss and understand the relationship between data sets and their graphical representations (e.g., bar graphs, line graphs, circle graphs, histograms, stem-and-leaf plots, box plots, and scatterplots).</p>	<p>--Choose among tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.</p>
<p>8.5.3 Develop and evaluate inferences and predictions that are based on data.</p> <p>a. make conjectures and predictions based on data;</p>	<p>--Predict outcomes and explain results of mathematical models and experiments.</p> <p>--Use tables, bar graphs, line graphs, a Cartesian coordinate system, and equations to model aircraft conflicts and predict outcomes.</p>